

Interim Report

North Landfill Early Remedial Action



Reynolds Metals Company
TROUTDALE FACILITY

CH2MHILL

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SECTION 1

Introduction

This report documents the removal of contaminated soil from the north landfill (NLF) area at the Reynolds Metals Company/Alcoa (RMC/Alcoa) facility in Troutdale, Oregon. The work was conducted in accordance with the U.S. Environmental Protection Agency's (EPA) *Unilateral Administrative Order for Remedial Design and Remedial Action* (2003); *Record of Decision for Interim Remedial Action* (2002); *Scope of Work for Early Remedial Action Reynolds Metals Superfund Site* (2003); and CH2M HILL's *Memorandum WP No. 56: North Landfill Early Remedial Action Work Plan* (June 2003). This early remedial action included excavation of contaminated soil, confirmation sampling, offsite transport and disposal of the excavated material, installation of riprap cover, and site final restoration activities.

The NLF early remedial action was conducted concurrent with early remedial action at Company Lake. For this reason, NLF remedial design and characterization data are contained in various documents related to Company Lake, as referenced in this report.

Early remedial action objectives (RAOs) for the NLF include:

- Preventing human exposure through direct contact (ingestion, inhalation, and dermal contact) with contaminated soil and debris that would result in unacceptable excess lifetime cancer risk or exceed a Hazard Index of 1.
- Minimizing the migration of constituents from waste and soils to groundwater.
- Reducing fluoride concentrations in shallow and intermediate groundwater zones.
- Preventing erosion and transport of contaminated soil and debris from west NLF.

The following site-specific cleanup goals were identified for the NLF early remedial action (EPA, 2002):

- Excavate (and remove for offsite disposal) waste material and additional underlying soil, as needed, to achieve a mean total fluoride concentration in soil of less than 4,000 milligrams per kilogram (mg/kg) total fluoride and benzo(a)pyrene and dibenzo(a,h)anthracene concentrations of less than 36 mg/kg.
- Install a riprap cover to protect landfill contents from erosion and washout (west NLF).

The elements required under Section V, Task 3 of the Scope of Work of EPA's *Unilateral Administrative Order for Remedial Design and Remedial Action* are summarized in this final report. This report presents a summary of the early remedial action; an explanation of the exceptions to the plan; results of site monitoring; and an explanation of long-term monitoring. The report also includes a good-faith estimate of total costs; the quantities and types of material removed; the ultimate destination of the removed materials; a description of the sampling and analyses; and appendixes containing all relevant documentation, such as data, manifests, and bills of lading.

This report is organized into the following sections:

- Section 1: Introduction
- Section 2: Background

- Section 3: North Landfill Early Remedial Action
- Section 4: Sampling and Analysis
- Section 5: Costs
- Section 6: References
- Appendixes A through H

SECTION 2

Background

This section describes the NLF area, previous site investigations, and cultural resource findings.

2.1 Area Description

The NLF is approximately 2.7 acres in size and is located in a wooded area north of Company Lake, as shown on Figure 2-1. Most of the landfill is located within the 10-year floodplain of the Columbia River. The landfill was active from about 1968 until 1985 and was used for the disposal of a variety of materials, including carbon waste, refractory brick, demolition debris, and miscellaneous debris. The NLF is divided into east and west halves by the outfall access road. The west half of the landfill is approximately 6 feet deep. The east half was estimated to be at least 15 feet deep. Excess fill material (slag) acquired by RMC/Alcoa during implementation of the Superfund project was stockpiled on the east half of the NLF.

Constituents detected in samples collected from the NLF prior to implementation of the early remedial action included fluoride, metals, polychlorinated biphenyls (PCBs), cyanide, and polynuclear aromatic hydrocarbons (PAHs). A summary of historical analytical data for the NLF is included as Appendix A.

2.2 Previous Investigations

Site investigations took place at the NLF area in 1993, 1994, and 1997. Investigation activities included waste sample collection, composite samples from test pits, and composite surface and subsurface soil samples from test pits. Detailed analytical data from these investigations can be found in the following documents:

- *Final Site Inspection Prioritization Report* (PRC Environmental Management, Inc., October 1993)
- *Removal Site Assessment Report, Volume 1, Technical Report and Volume 2, Technical Appendixes* (CH2M HILL, January 1995)
- *Draft Current Situation Summary* (CH2M HILL, April 5, 1996)
- *Technical Memorandum DS No. 16: Data Summary for the Soil and Debris Areas Addendum to the RI/FS Work Plan – 1997 Sampling at North Landfill, South Landfill, and Scrap Yard* (CH2M HILL, December 15, 1997)
- *Memorandum No. 21: Addendum No. 2 to Specifications for Excavation and Transportation of Company Lake Process Residue* (CH2M HILL, May 20, 2003)

- *Memorandum No. 22: Addendum No. 2 to Specifications for Disposal of Excavated Material from Company Lake* (CH2M HILL, May 21, 2003)

In January 1993, two waste samples were collected by PRC Environmental Management, Inc., and analyzed for volatile organic compounds (VOCs), PAHs, metals, cyanide, and fluoride. The analytical results identified the presence of PAHs, metals, cyanide, and fluoride in area soils (PRC, October 1993).

In June/July 1994, soil samples were collected from 17 test pits installed east and west of the outfall access road. Samples were analyzed for cyanide, fluoride, total metals, PCBs, PAHs, total petroleum hydrocarbons (TPH), VOCs, and toxicity characteristic leaching procedure (TCLP) for the eight Resource Conservation and Recovery Act (RCRA) metals. PAHs, PCBs, metals, cyanide, TPH, and fluoride were identified in area soils at varying concentrations (CH2M HILL, 1995).

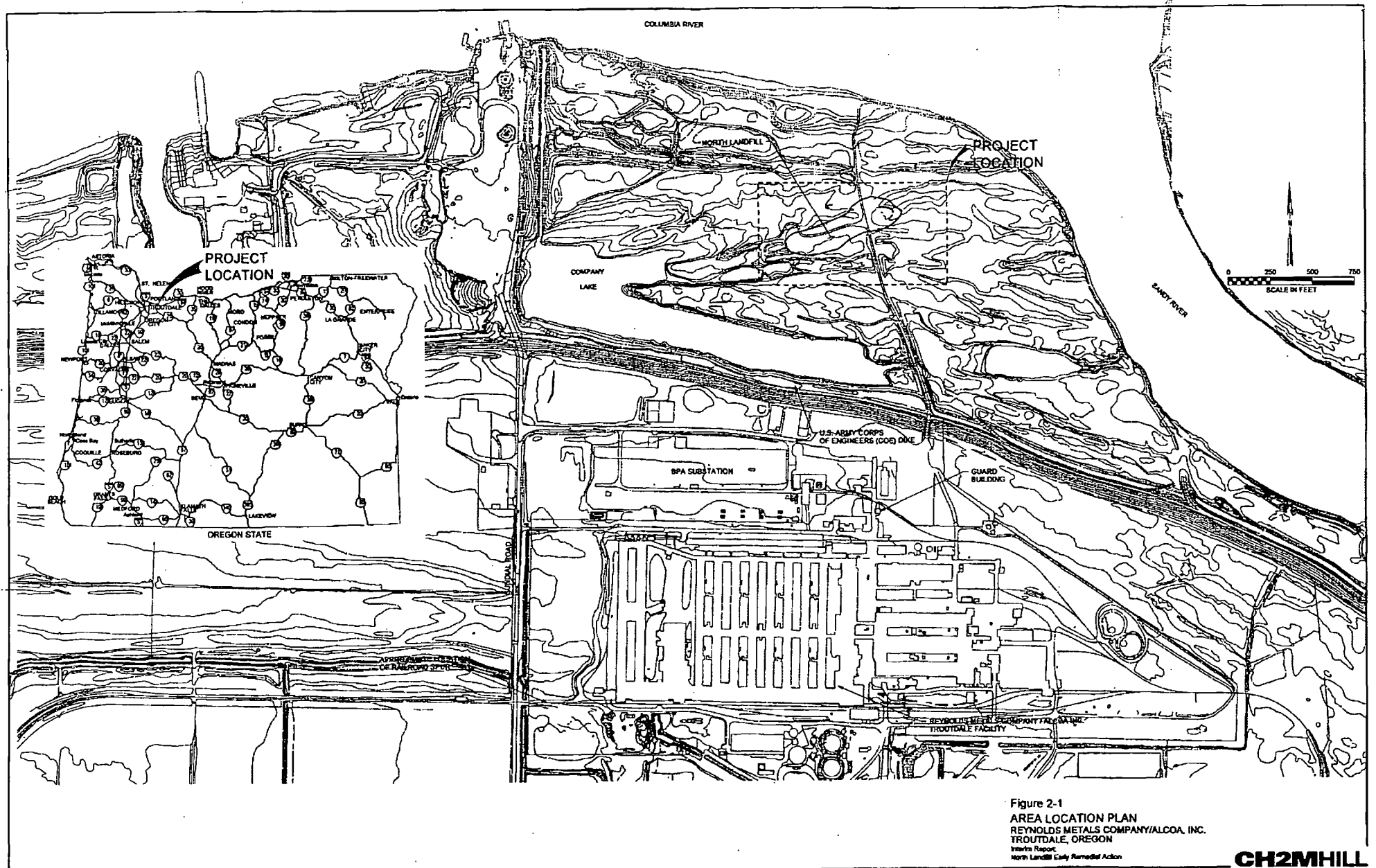
In June 1997, composite surface soil samples were collected along five evenly spaced transects. Samples were analyzed for fluoride, cyanide, PAHs, PCBs, and total metals. Elevated concentrations of PAHs were discovered along one transect on the east end of the NLF. The discrete samples from the transect composite were analyzed for PAHs separately, and the elevated concentrations were found in two samples in a localized area. Metals concentrations were highest along the same transect. The estimated lateral extent of the landfill was extended based on test pit information.

On the basis of preconstruction analytical results and test pit observations, waste cut limits were estimated for the early remedial action at the NLF site. Anticipated waste cross sections are shown in Drawing NL-5 of *Memorandum No. 21: Addendum No. 2 to Specifications for Excavation and Transportation of Company Lake Process Residue* (CH2M HILL, May 20, 2003).

2.3 Cultural Resources

CH2M HILL completed a pedestrian survey of the Company Lake and North Landfill work areas and reviewed proposed plans for potential impacts to area cultural resources in June of 2003. Based on available information, no additional cultural resource testing or monitoring was recommended for the North Landfill work site (CH2M HILL, July 25, 2003). Additional subsurface archaeological testing was accomplished by CH2M HILL on June 13, 2003, of selected upland areas adjacent to the Company Lake site. A total of ten (10) shovel test units were placed to a maximum depth of 40 centimeters (16 inches) below ground surface (bgs). No evidence of prehistoric cultural activities was observed.

No cultural deposits were encountered during site construction and restoration activities in the NLF work area.



SECTION 3

North Landfill Early Remedial Action

Approximately 10,509 tons of waste material were removed from the eastern portion of the NLF from August 13 through November 3, 2003. Approximately 755 tons (7 percent) were transported directly to the Hillsboro Landfill (owned and operated by Waste Management, Inc.) for final disposal. Concurrent with removal activities from the eastern portion of NLF, process residue (PR) material was also being removed from Company Lake. To improve PR material handling, removal, and transport at the Company Lake site, 9,754 tons (93 percent) of NLF waste material were hauled in solo dump trucks to Company Lake and mixed with the PR prior to transport and disposal at Hillsboro Landfill. The resulting mixture met transport and disposal facility requirements. Confirmation soil samples were collected from the east NLF area after excavation activities were completed. Photographs documenting field activities are contained in Appendix B.

CH2M HILL was responsible for design, bid document preparation, confirmation sampling, analytical laboratory selection, data quality evaluation, owner construction oversight, and reporting. BBL Environmental Services, Inc. (BBLES), provided overall site management duties for RMC/Alcoa. ENTACT, Inc., under subcontract to BBLES, provided excavation, waste loadout, site restoration, and final grading services. Enviro-Con Trucking, Inc. (ECTI), under subcontract to BBLES, Inc., transported waste materials to the Hillsboro Landfill for final disposal.

The following sections describe the major work components involved in the early remedial action at the NLF.

3.1 Site Preparation/Traffic Management

Site preparation work included removing brush and identifying landfill boundaries, maintaining the boundaries of the excavation area, and verifying that the construction area was clear of utilities in accordance with *Specifications for Excavation and Transportation of Company Lake Process Residue* (CH2M HILL, April 2003), and *Memorandum No. 21: Addendum No. 2 to Specifications for Excavation and Transportation of Company Lake Process Residue* (CH2M HILL, May 20, 2003).

Vehicular traffic was restricted to designated routes, as shown on Figure 3-1. In general, truck traffic was limited to one-way directional flow. Real-time communications between field crew members and truck drivers were maintained through the use of citizen band (CB) and hand-held radios. Trucks entering the site were equipped with CB radios, or were escorted by the construction contractor. ENTACT, Inc., was responsible for maintaining and improving site access roads during site preparation, excavation, and restoration phases of the project.

3.2 Excavation

Excavation activities in the east area of the NLF began on August 13, 2003, with removal of the slag aggregate pile. Waste material removal actions continued intermittently at the site through November 3, 2003. Depending on the observed thickness of waste material encountered, excavation depths ranged from 1 foot to 15 feet bgs. A Hitachi EX 300 trackhoe excavator was used to remove waste material from the site for direct loading into dump trucks. In general, excavation activities proceeded in an east-to-west direction. Confirmation sample locations and final site elevations for the NLF are shown on Figure 3-2.

During removal of waste material from the northeast corner of the landfill, additional waste material was identified in the vicinity of MW21-025. Test cuts installed adjacent to the monitoring well indicated waste material extended to the north beyond MW21-25, but did not reach MW21-063. Monitoring well MW21-025 was decommissioned on October 27, 2003. A replacement monitoring well is scheduled to be installed in the spring/summer of 2004.

Paper, wood, and debris were also observed under 2 feet of cover soil along the northeastern boundary of the NLF. Test cuts did not identify any brick or process-related material in the debris. Based on the lack of process-related material, the buried debris was not removed from this area.

3.3 Dust Monitoring

CH2M HILL conducted dust monitoring using a MIE Mini RAM air monitoring device, to document contractor compliance with project specifications and site-specific action levels [less than 0.75 milligrams per cubic meter (mg/m³)]. Measurements were taken in different work areas several times a day on dry days. No measurements were taken on rainy days or when the ground surface was wet. If dry conditions were encountered or dust was detected, a fire hose or water truck was used to wet the roads and work areas. A summary of dust monitoring results is presented in Appendix C.

3.4 Offsite Transportation and Disposal

Waste material was loaded into trucks and hauled offsite for disposal or stockpiled for mixing with Company Lake PR from August 13 through November 3, 2003. Waste material was transported by ECTI to Waste Management, Inc.'s Hillsboro Landfill (Hillsboro, Oregon) for disposal under waste profile permit nos. 6808 and 6906. Table 3-1 is a daily summary of tonnage hauled directly to the landfill, and tonnage transported to Company Lake for mixing with PR each day. Daily truck disposal logs, landfill weight tickets, and nonhazardous waste manifests are presented in Appendix D.

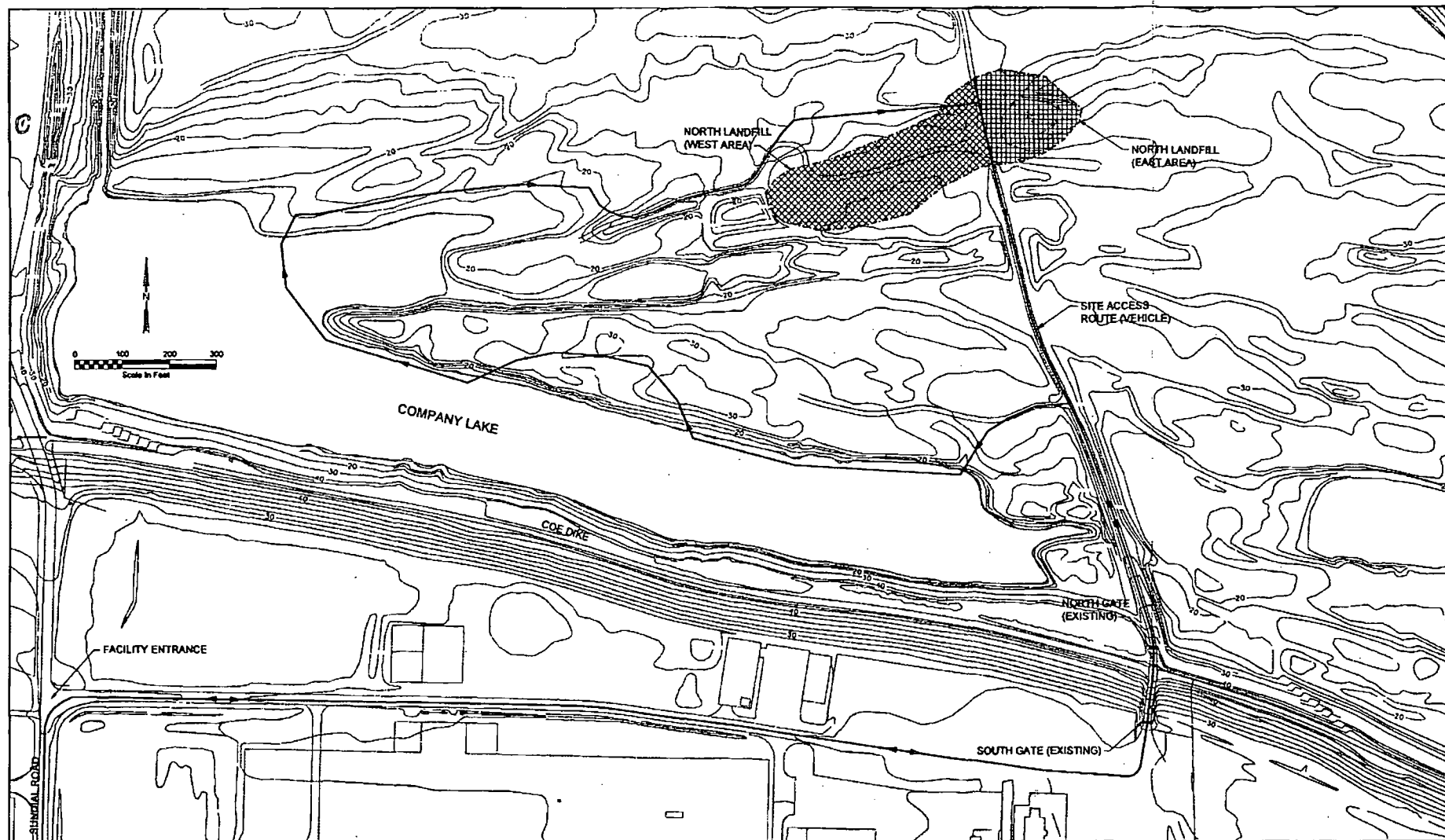


Figure 3-1
 VEHICLE ACCESS PLAN
 REYNOLDS METALS COMPANY/ALCOA, INC.
 TROUTDALE, OREGON
 Interim Report
 North Landfill Early Remedial Action

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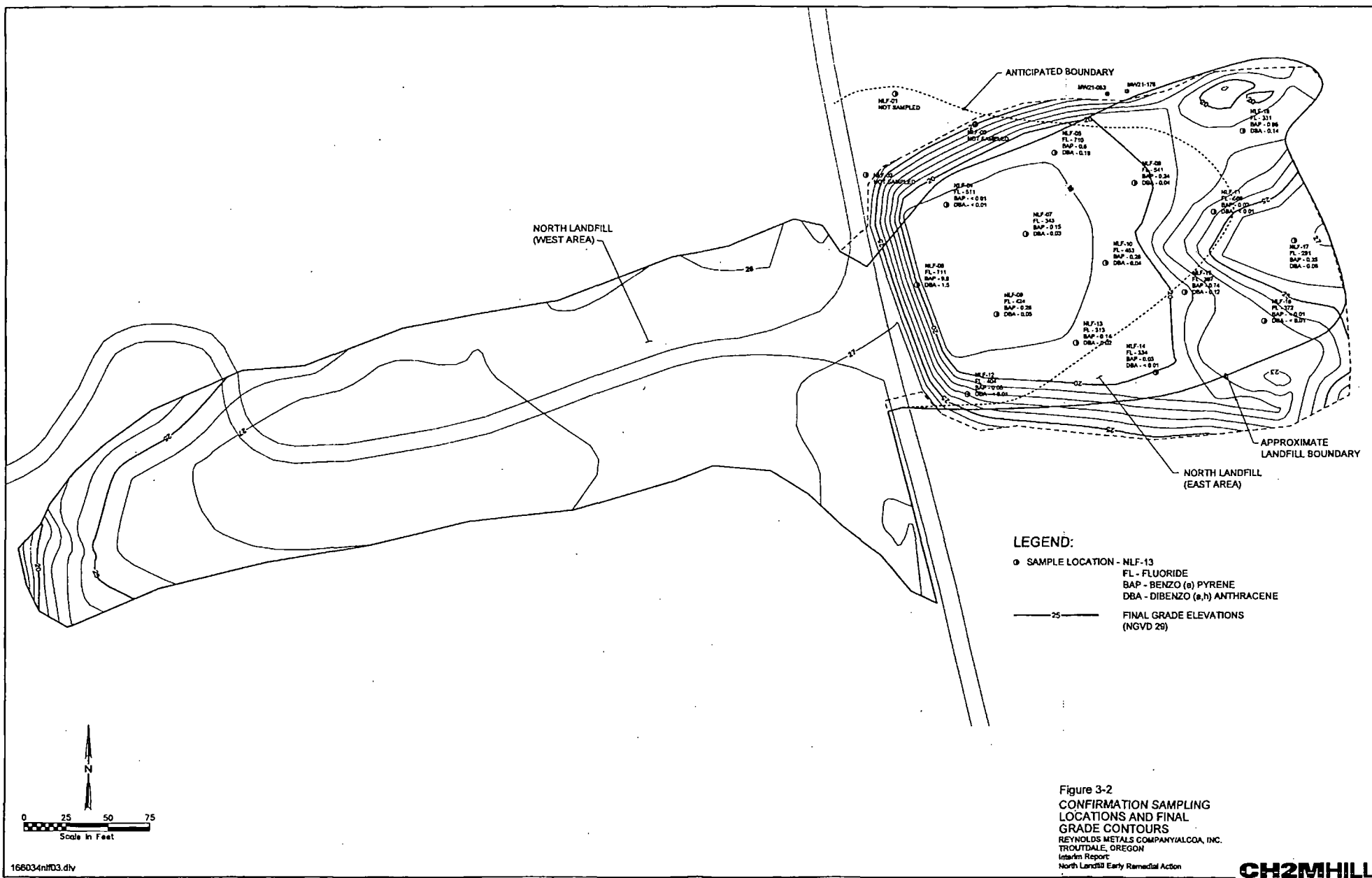


Table 3-1
Daily North Landfill Disposal Tonnage

Date	No. of Loads	Daily Total for Offsite Disposal (tons)	Daily Total to Company Lake (tons)	Cumulative Total for Offsite Disposal (tons)	Cumulative Total to Company Lake (tons)
8/13/03	12	403.4	-	403.4	-
8/14/03	6	207.4	-	610.8	-
9/20/03	26	-	330.9	610.8	330.9
9/21/03	44	-	559.9	610.8	890.8
9/23/03	38	-	483.6	610.8	1,374.3
9/24/03	18	-	229.1	610.8	1,603.4
9/25/03	38	-	483.6	610.8	2,086.9
9/27/03	4	-	50.9	610.8	2,137.8
9/29/03	21	-	267.2	610.8	2,405.0
9/30/03	16	-	241.6	610.8	2,646.6
10/1/03	4	-	55.0	610.8	2,701.6
10/2/03	12	-	172.9	610.8	8,796.2
10/6/03	17	-	247.4	610.8	2,874.5
10/7/03	22	-	320.1	610.8	3,121.8
10/8/03	22	-	320.1	610.8	3,762.0
10/10/03	30	-	436.5	610.8	4,198.5
10/11/03	35	-	509.3	610.8	4,707.8
10/14/03	16	-	232.8	610.8	4,940.6
10/15/03	17	-	247.4	610.8	5,187.9
10/16/03	38	-	552.9	610.8	5,740.8
10/17/03	43	-	625.7	610.8	6,366.5
10/20/03	23	-	334.7	610.8	6,701.1
10/22/03	3	58.5	-	669.3	6,701.1
10/22/03	36	-	535.4	669.3	7,236.5
10/23/03	3	47.8	-	717.1	7,236.5
10/23/03	44	-	640.2	717.1	7,876.7
10/24/03	2	37.8	-	754.9	7,876.7
10/24/03	13	-	189.2	754.9	8,065.8
10/25/03	31	-	451.1	754.9	8,516.9
10/28/03	33	-	480.2	754.9	8,997.0
10/29/03	26	-	378.3	754.9	9,375.3
10/30/03	20	-	291.0	754.9	9,666.3
11/3/03	6	-	87.5	754.9	9,753.9
Total				754.9	10,508.8

3.5 Site Restoration

3.5.1 East North Landfill

Following waste removal actions, a Caterpillar D6 bulldozer was used to final grade the excavated east NLF area on November 12, 2003. Armoring stones were installed along the eastern edge of the outfall road on November 17, 2003, and erosion control matting was installed on all perimeter side slopes greater than 4 horizontal to 1 vertical (4H:1V) on December 4, 2003.

3.5.2 West North Landfill

The west area of the NLF was cleared of surface brush and debris on September 9, 2003. Large debris items were removed and disposed of offsite. Brush and wood debris was pushed and left in place along the southern edge of the west NLF. The area was graded using a Caterpillar D6 bulldozer and covered with 6 inches of surface rock (riprap) to prevent future erosion of the landfill. Perimeter side slopes were sloped to eliminate the need for armoring stone.

3.6 Modifications to Work Plans

3.6.1 East North Landfill

Proposed 6-inch topsoil cover and area hydroseeding activities in the east NLF were postponed because of wet weather conditions. BBLES will return to the site in June/July 2004 to complete topsoil installation and hydroseeding activities.

3.6.2 West North Landfill

Brick from Company Lake outfall dike was not used as fill material in the west NLF. Outfall dike removal was delayed because of wet weather conditions. Outfall dike brick will be removed and transported offsite for disposal in the fall of 2004.

Armoring stone and erosion control matting were not installed in the west NLF. Perimeter side slopes were sloped to eliminate the requirements for installing armoring stone and erosion control matting (CH2M HILL, May 20, 2003).

3.7 Long-Term Monitoring Requirements

3.7.1 East North Landfill

Requirements consist of annual inspection, maintenance, and repair of armoring stones along the eastern edge of the outfall access road.

3.7.2 West North Landfill

Requirements consist of annual inspection, maintenance, and repair of surface rock (riprap) cover.

3.8 EPA Oversight

EPA oversight activities were provided by Mr. Chip Humphrey, U.S. Environmental Protection Agency, Region 10.

SECTION 4

Sampling and Analysis

Sampling and analysis activities associated with the NLF removal action included collection of the following samples:

- Waste characterization soil samples from various locations across the east NLF to profile waste material for disposal at the Hillsboro Landfill.
- Confirmation soil samples to demonstrate the effectiveness of the removal effort from the east NLF area.

4.1 Waste Profile Sampling

BBLES collected 10 grab samples from test pit locations across the east NLF on August 18 and 19, 2003. The samples were sent to Columbia Analytical Services, Inc. (an RMC/Alcoa-approved analytical laboratory) located in Kelso, Washington, for waste profiling analyses. TCLP results from sample TP-6 exceeded lead disposal requirements. CH2M HILL collected four additional soil samples from TP-6 on September 30, 2003, to confirm previous test results. Soil samples were submitted to CH2M HILL's Applied Sciences Laboratory in Corvallis, Oregon, for total and TCLP lead analysis. Based on additional sampling data, wastes met landfill disposal requirements. Complete analytical results from both sampling events are contained in Appendix E.

4.2 Confirmation Sampling

On November 3, 2003, 15 confirmation soil samples plus two duplicate soil samples were collected from the excavation area and analyzed for total fluoride and PAHs. Samples were collected from a depth interval of 0 to 6 inches below final excavation limits (sample locations are shown on Figure 3-2). Sampling activities were accomplished in accordance with *Memorandum No. 24: North Landfill Field Sampling Plan, RMC-Troutdale* (CH2M HILL, August 11, 2003). Confirmation sampling analytical results are included in Appendix F.

4.2.1 Quality Assurance/Quality Control

Duplicate soil samples were collected at sample locations NL-CS08 and NL-CS09. Quality assurance/quality control (QA/QC) samples met all acceptance criteria, except as noted. Data generated are considered 100 percent usable. A review of the project data usability and QA/QC results is included in Appendix G.

4.2.2 Analysis and Residual Risk

Confirmation soil samples were sent to CH2M HILL's Applied Sciences Laboratory in Corvallis, Oregon, for total fluoride analysis, and to the Columbia Analytical Services, Inc., laboratory in Redding, California, for PAH analysis. A summary of the analytical results is presented in Table 4-1. A complete listing of analytical results is included in Appendix F.

Site-specific cleanup goals identified in *Memorandum WP No. 56: North Landfill Early Remedial Action Work Plan* (CH2M HILL, June 2003) for the NLF site include:

- Removal and offsite disposal of waste material currently present in the east NLF area
- Removal of waste material and underlying soil to achieve a total fluoride concentration of less than 4,000 mg/kg
- Removal of waste material and underlying soil to achieve benzo(a)pyrene and dibenzo(a,h)anthracene concentrations of less than 36 mg/kg
- Installation of a riprap cover over the west NLF to protect landfill contents from erosion

All site-specific cleanup goals were exceeded as a result of this removal action. Surface and subsurface waste material was removed based on visual observations by site representatives (see photo log in Appendix B). Confirmation soil sample results yielded mean fluoride, benzo(a)pyrene, and dibenzo(a,h)anthracene values of 437, 0.85, and 0.13 mg/kg, respectively. The maximum observed concentrations following removal activities were 711, 9.8, and 1.5 mg/kg, respectively.

Waste material thicknesses ranged from 1 to 15 feet across the east NLF. Waste material and approximately 0.5 foot of underlying soil were removed and disposed of offsite under this project. On the basis of average fluoride concentrations identified during previous test pit sampling efforts, approximately 46,335 kg (102,150 pounds) of total fluoride mass were removed under this removal action.

Analytical results were used to estimate the risk to human health receptors following the removal action. The estimated risk was calculated by using the exposure scenarios presented in the *Draft Baseline Risk Assessment, Part 1 – Nongroundwater Media* (CH2M HILL, May 1999). Risk estimates were calculated for both the east and west NLF based on anticipated future site use. Risk estimate calculation spreadsheets for the recreational and trench worker scenarios are contained in Appendix H of this report.

Table 4-2 provides a summary of cumulative human health risks before and after the 2003 remedial action at the NLF. Prior to the 2003 remedial action [based on reasonable maximum exposure (RME) criteria], estimated risks were below EPA's target risk level of 1×10^{-4} for excess cancer risks and had a noncancer risk index below 1. However, the Oregon Department of Environmental Quality's (DEQ) cumulative target risk level of 1×10^{-5} and individual constituent risk levels of 1×10^{-6} were exceeded.

Table 4-1
Results from November 3, 2003, Sampling Event at North Landfill

Compound	Units	NLCS04-0	NLCS05-0	NLCS06-0	NLCS07-0	NLCS08-0	NLCS08-1	NLCS09-0	NLCS09-1	NLCS10-0	NLCS11-0	NLCS12-0	NLCS13-0	NLCS14-0	NLCS15-0	NLCS16-0	NLCS17-0	NLCS18-0
Fluoride	mg/Lg	511	710	711	343	541	323	424	389	453	568	404	320	334	397	372	291	331
Acenaphthene	mg/kg	0.0069 U	0.082	0.63 D	0.009	0.014	0.023	0.014	0.01	0.017	0.0064 UJ	0.069 U	0.0076	0.0068 U	0.044	0.0068 U	0.021	0.057
Acenaphthylene	mg/kg	0.0069 U	0.0068 U	0.067 U	0.0068 U	0.0067 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0064 UJ	0.069 U	0.0067 U	0.0068 U	0.0067 U	0.0068 U	0.0069 U	0.0066 U
Anthracene	mg/kg	0.0069 U	0.089	0.92 D	0.013	0.02	0.033	0.017	0.018	0.034	0.0025 J	0.069 U	0.016	0.0031 J	0.087	0.0068 U	0.033	0.11
Benzo(a)anthracene	mg/kg	0.0045 J	0.59 D	7.3 D	0.12	0.2	0.32	0.16	0.11	0.23	0.017 J	0.033 DJ	0.11	0.022	0.62 D	0.0048 J	0.31	0.76 D
Benzo(a)pyrene	mg/kg	0.0059 J	0.8 D	9.8 D	0.15	0.24	0.39 D	0.26	0.18	0.28	0.019 J	0.063 DJ	0.14	0.026	0.74 D	0.0056 J	0.35 D	0.95 D
Benzo(b)fluoranthene	mg/kg	0.0066 J	0.8 D	10 D	0.15	0.24	0.41 D	0.24	0.15	0.33	0.021 J	0.066 DJ	0.15	0.027	0.78 D	0.0059 J	0.39 D	1 D
Benzo(g,h,i)perylene	mg/kg	0.0045 J	0.58 D	6.5 D	0.093	0.15	0.25	0.2	0.13	0.17	0.01 J	0.033 DJ	0.074	0.015	0.44 D	0.0029 J	0.21	0.58 D
Benzo(k)fluoranthene	mg/kg	0.0025 J	0.33 D	4.3 D	0.055	0.12	0.18	0.16	0.074	0.12	0.0088 J	0.02 DJ	0.058	0.013	0.3 D	0.0031 J	0.15	0.35 D
Chrysene	mg/kg	0.0049 J	0.6 D	7.4 D	0.12	0.2	0.33	0.19	0.12	0.25	0.02 J	0.061 DJ	0.12	0.025	0.71 D	0.0052 J	0.34	0.9 D
Dibenzo(a,h)anthracene	mg/kg	0.0011 J	0.18	1.5 D	0.025	0.038	0.066	0.048	0.031	0.043	0.0032 J	0.069 U	0.019	0.004 J	0.12	0.0068 U	0.058	0.14
Fluoranthene	mg/kg	0.0055 J	0.65 D	8.3 D	0.14	0.24	0.37 D	0.21	0.15	0.31 D	0.027 J	0.055 DJ	0.19	0.035	0.89 D	0.0071	0.36 D	1.2 D
Fluorene	mg/kg	0.0069 U	0.039	0.36 D	0.0048 J	0.0066 J	0.011	0.006 J	0.0043 J	0.0092	0.0064 UJ	0.069 U	0.0029 J	0.0068 U	0.022	0.0068 U	0.0093	0.028
Indeno(1,2,3-cd)pyrene	mg/kg	0.0049 J	0.67 D	8 D	0.12	0.18	0.31	0.25	0.16	0.21	0.013 J	0.033 DJ	0.091	0.018	0.53 D	0.0042 J	0.25	0.7 D
Naphthalene	mg/kg	0.00052 J	0.0081	0.1 D	0.0013 J	0.0015 J	0.0029 J	0.0015 J	0.0011 J	0.003 J	0.00035 J	0.069 U	0.0011 J	0.00088 J	0.0067	0.001 J	0.0031 J	0.0084
Phenanthrene	mg/kg	0.0023 J	0.32	3.2 D	0.05	0.085	0.14	0.099	0.065	0.15	0.011 J	0.069 U	0.07	0.014	0.33 D	0.0034 J	0.15	0.44 D
Pyrene	mg/kg	0.005 J	0.64 D	7.9 D	0.12	0.22	0.33	0.17	0.11	0.3	0.023 J	0.075 D	0.16	0.031	0.86 D	0.0062 J	0.34	1.2 D

Notes:

Fluoride analysis was run at the CH2M HILL Applied Sciences laboratory. All other analyses were run at Columbia Analytical Services, Inc.

D = This qualifier is used for all the compounds identified in an analysis at a secondary dilution factor.

J = Indicates an estimated value.

U = Indicates the compound was analyzed for but not detected at the reporting limit specified

Table 4-2
Human Health Risk Reduction
Reasonable Maximum Exposure Scenario

	Recreational Scenario	Trench Worker Scenario
	Cumulative Excess Lifetime Cancer Risk	Cumulative Excess Lifetime Cancer Risk
North Landfill Prior to Excavation	7.10×10^{-5}	6.61×10^{-5}
East NLF Following Excavation	3.16×10^{-6}	3.87×10^{-6}
% Risk Reduction	95.5%	94.1%
West NLF Following Cover	N/C	3.90×10^{-6}
N/C = Not calculated. Risk pathway is not complete.		

Risk reductions following the removal actions at east NLF ranged from 94 to 96 percent. Cumulative risks were below EPA's target risk levels of 1×10^{-4} for excess cancer risk, and the noncancer hazard index was less than 1 for both the recreational and trench worker scenarios. Cumulative risks were also below DEQ's target level of 1×10^{-5} for cancer risks and less than 1 for the noncancer hazard index. Individual constituents of potential concern (COPCs) were all below DEQ's target risk level of 1×10^{-6} except for benzo(a)pyrene [1.55×10^{-6} (recreational); 2.01×10^{-6} (trench worker)]. Installation of the 6-inch topsoil cover at the east NLF site in June/July 2004 will eliminate the recreational use exposure pathway for this area.

Installation of the 6-inch surface rock cover at the west NLF eliminated the recreational use exposure pathway for this area. Cumulative risks for the west NLF were below both EPA's and DEQ's target risk levels for the trench worker scenario. Individual COPCs were also below DEQ's target risk level of 1×10^{-6} except for benzo(a)pyrene and total PCBs (1.06×10^{-6} and 1.49×10^{-6} , respectively).

SECTION 5

Costs

Costs for the early remedial action at the NLF are summarized in Table 5-1. Included in the table are costs for CH2M HILL's engineering and oversight services, as well as transportation and disposal contractors' expenditures. Costs incurred by EPA and RMC/Alcoa are not included.

Table 5-1 Summary of Costs for Early Remedial Action at North Landfill		
Contractor	Description of Work	Cost
CH2M HILL	Early action options analysis, preconstruction sampling, cost estimating, agency submittals, design, construction oversight, bid document preparation, laboratory coordination, confirmation sampling, and final reporting	\$77,250
BBLES	Excavation, transportation, and site restoration	\$280,100
Hillsboro Landfill	Disposal of material at Hillsboro Landfill	\$152,400
Total		\$509,750

SECTION 6

References

CH2M HILL. 1995. *Removal Site Assessment Report, Volume 1, Technical Report and Volume 2, Technical Appendixes*. January 1995.

CH2M HILL. 1996. *Draft Current Situation Summary*. April 5, 1996.

CH2M HILL. 1997. *Technical Memorandum DS No. 16: Data Summary for the Soil and Debris Areas Addendum to the RI/FS Work Plan – 1997 Sampling at North Landfill, South Landfill, and Scrap Yard*. December 15, 1997.

CH2M HILL. 1999. *Draft Baseline Risk Assessment, Part 1 – Nongroundwater Media*. May 1999.

CH2M HILL. 2003. *Specifications for Excavation and Transportation of Company Lake Residue*. April 2003.

CH2M HILL. 2003. *Memorandum No. 21: Addendum No. 2 to Specifications for Excavation and Transportation of Company Lake Process Residue*. May 20, 2003.

CH2M HILL. 2003. *Memorandum No. 22: Addendum No. 2 to Specifications for Disposal of Excavated Material from Company Lake*. May 21, 2003.

CH2M HILL. 2003. *Memorandum WP No. 56: North Landfill Early Remedial Action Work Plan*. June 2003.

CH2M HILL. 2003. *Memorandum No. 24: North Landfill Field Sampling Plan, RMC-Troutdale*. August 11, 2003.

PRC Environmental Management, Inc. 1993. *Final Site Inspection Prioritization Report*. October 1993.

U.S. Environmental Protection Agency (EPA). 2002. *Record of Decision for Interim Remedial Action*. September 30, 2002.

U.S. Environmental Protection Agency (EPA). 2003. *Unilateral Administrative Order for Remedial Design and Remedial Action*. July 17, 2003.

U.S. Environmental Protection Agency (EPA). 2003. *Scope of Work for Early Remedial Action Reynolds Metals Superfund Site*.